RESEARCH HIGHLIGHTS

Technical Series 99-110

RESEARCH PROJECT ON THE REDUCTION OF NOISE PRODUCED BY GARAGE DOORS IN MULTIPLE HOUSING PROJECTS

Introduction

The noise produced by the opening and closing of garage doors in multiple housing projects is often a source of annoyance. The purpose of this study was to examine, under real conditions, the noise transmitted into living quarters located above the garage entrance. The noise transmission was evaluated at the time of opening and closing doors equipped with and without anti-vibration devices.

Anti-vibration Devices Tested

The tested anti-vibration devices described in this research report were chosen for their cost and because they can be installed by qualified garage door installers who do not specialize in acoustics or noise control. The devices were to provide sufficiently firm support to avoid excessive movement of the tracks and the mechanism during the operation of the doors. This last condition is usually required by most garage door suppliers and installers for them to guarantee the cushioned doors by a warranty equivalent to that for doors installed without anti-vibration cushioning.

Results

The limited data collected during this study indicate that it is possible to reduce the average noise levels produced by opening and closing garage doors by approximately 7 to 13 dB(A) This can be achieved by reducing the mechanical coupling between the door components and the building structure. For manually operated garage doors, this is a matter of inserting neoprene cushions at the attachment points of the door tracks to the structure. For mechanically operated doors, in addition to the door tracks, it is necessary to equip the door's drive mechanism with neoprene cushions. According to the study results, the mechanical doors are less noisy than the non-mechanized doors.

Concrete Buildings

In concrete buildings, the cushioning of the garage door tracks and mechanisms should allow the door's operating noise to be reduced in the living quarters situated directly overhead to an average noise level in the range of NC 25; this level corresponds approximately to the ambient noise level measured by NRC in approximately 600 homes across Canada (see Figure 1).

Wood-Frame Buildings

Installed as indicated in a wood-frame construction, the average noise level transmitted to the apartment situated above a mechanized or manually operated door exceeds the interval corresponding to the standard deviation of the average ambient noise level measured in Canadian homes by NRC for the 125 and 250 Hz octave bands (see Figure 2) and is therefore more likely to cause annoyance.

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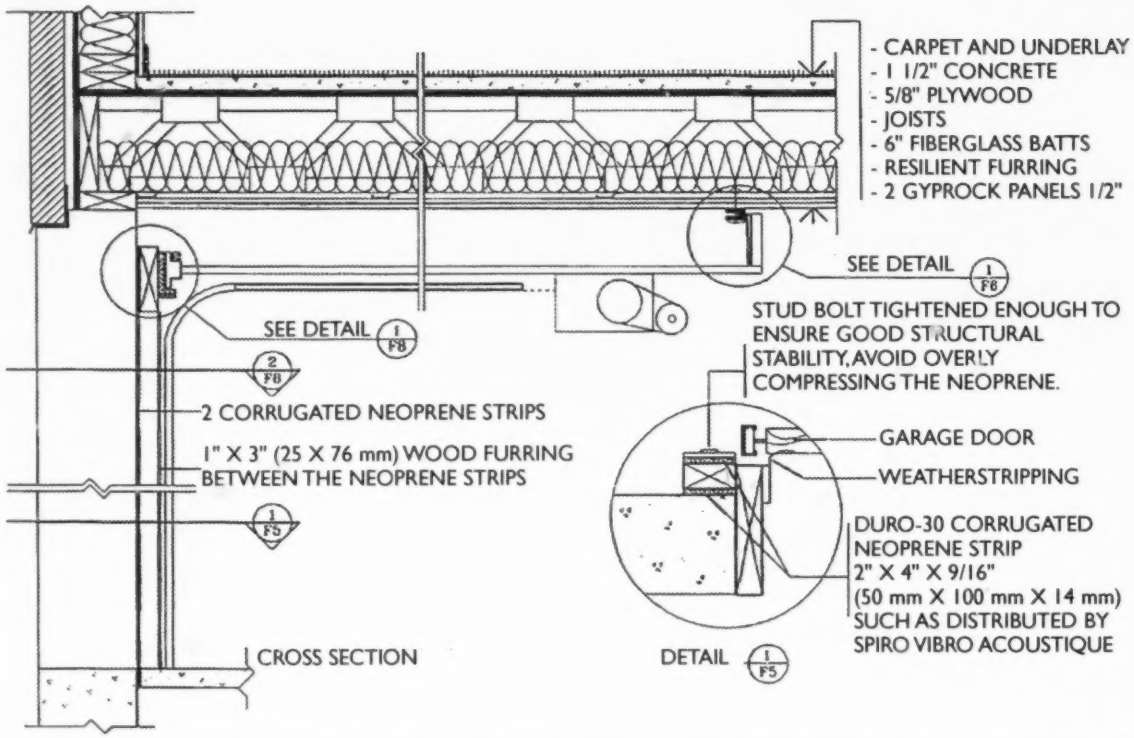
Figure 1: Installation of the suspension tracks and garage door opener


- CARPET AND UNDERLAY
- 1 1/2" CONCRETE
- 5/8" PLYWOOD
- JOISTS
- 6" FIBERGLASS BATTS
- RESILIENT FURRING
- 2 GYPROCK PANELS 1/2"
SEE DETAIL 1/F8
STUD BOLT TIGHTENED ENOUGH TO ENSURE GOOD STRUCTURAL STABILITY, AVOID OVERLY COMPRESSING THE NEOPRENE.
SEE DETAIL 1/F8
2/F8
2 CORRUGATED NEOPRENE STRIPS
1" X 3" (25 X 76 mm) WOOD FURRING BETWEEN THE NEOPRENE STRIPS
1/F5
CROSS SECTION
GARAGE DOOR
WEATHERSTRIPPING
DURO-30 CORRUGATED NEOPRENE STRIP
2" X 4" X 9/16"
(50 mm X 100 mm X 14 mm)
SUCH AS DISTRIBUTED BY SPIRO VIBRO ACOUSTIQUE
DETAIL 1/F5

Contribution to the Multiple Housing Construction Sector

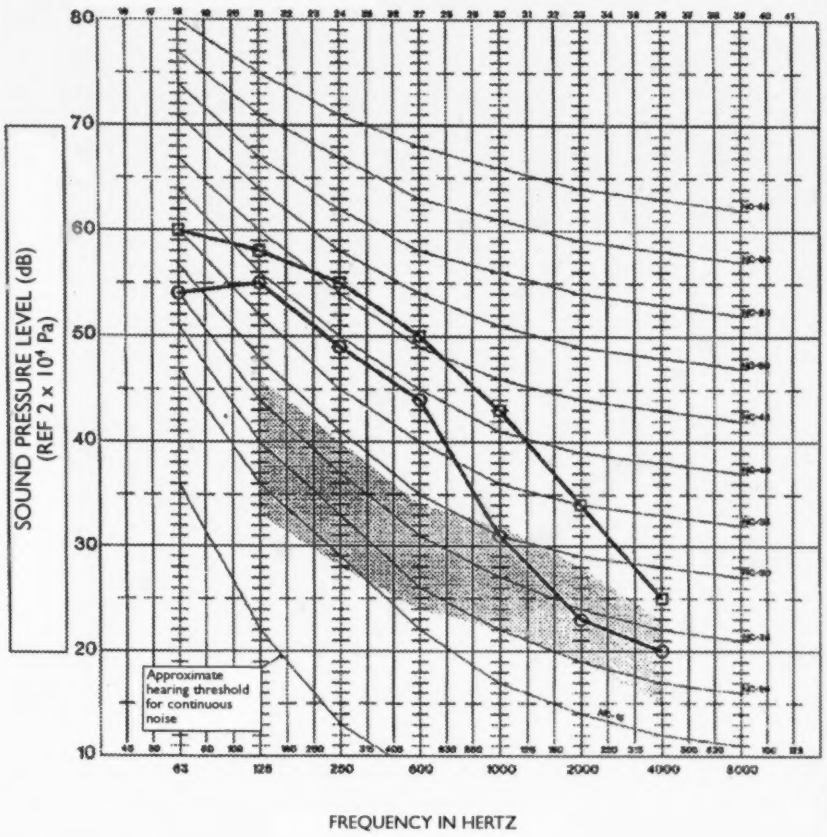
The noise produced by the garage door in a multiple housing project constitutes a significant source of annoyance for the occupants of the units situated directly overhead. The installation methods described in this research project attenuate the noise radiated into the units by 7 to 13 dB(A) when the door is operating, while also providing solid support for the tracks and the mechanism.

The noise optimization of the anti-vibration devices and the identification of the exact amount of soundproofing material derived from each device were not part of the objectives for this research project. These topics should be addressed in a later study conducted in a controlled research environment. Higher attenuation may be achieved with more flexible anti-vibration devices or by installing the door in a frame separated from the building's structure.

Figure 2: Noise Produced by Garage Doors

NOTE: THIS GRAPH ALONE DOES NOT CONSTITUTE A FULL REPORT

THIRD-OCTAVE BAND NO.



LEGEND

AVERAGE SOUND LEVELS MEASURED IN THE HABITABLE ROOMS SITUATED DIRECTLY ABOVE THE GARAGE DOORS

NON-CUSHIONED MECHANISM AND DOOR TRACK (45 dB(A))

CUSHIONED MECHANISM AND DOOR TRACK (38 dB(A))

STANDARD DEVIATION OF THE AVERAGE AMBIENT NOISE LEVEL CURVE MEASURED BY NRC IN 600 CANADIAN HOMES

PROJECT	STUDY ON NOISE PRODUCED BY GARAGE DOORS
TITLE OF GRAPH	IMPACT OF CUSHIONING THE MECHANISM WOOD FLOOR-CEILING ASSEMBLY MECHANIZED OPENING SYSTEM
FIGURE NO. 2	FILE: 177984-b
PROJECT NO. 177.9849905	DATE 94 05

Project Manager: Sandra Marshall

Research Report: *Research Project on the Reduction of Noise Produced by Garage Doors in Multiple Housing Projects*

Research Consultant: Michel Morin, MJM Conseillers en acoustique inc.

A full report on this project is available from the Canadian Housing Information Centre at the address below.

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